Converting a JR 10X jet to 12X – A Practical Guide by Craig Gottschang

JR radios have long been popular with jet flyers and many 10X users have now made the switch to the 2.4GHz 12X radio. Other 10X users have been reluctant to switch, at least partly due the effort and complexity of switching to a new technology and also having to replace the receiver/antennas and the daunting task of learning and programming a new transmitter. Having recently converted several of my jets, I have gained some knowledge and experience and have come up with a few ideas to make the process orderly and with some confidence that it has been done correctly. What follows is not a detailed explanation of how to program the 12X but rather, a *practical guide* to converting a 10X jet to a 12X.

Unfortunately, you can't just transfer the model data from your 10X to the 12X. The different number of channels and differences in programming prohibit this option. Therefore, the first thing I recommend is to get a paper tablet and record the existing setup you have on your 10X transmitter. I listed what function was assigned to each channel, what mixes were programmed, what each switch controls, and *every* parameter in the code function setups. Yes, I actually recommend recording each and every reverse position, travel adjust, dual rate, expo, sub-trim, servo speed, gyro sensitivity, mix setting, etc, etc.! The reason for this is that most of these settings and values can eventually be entered into the 12X in the appropriate place and will generally give you the same result you had with the 10X, saving you a lot of time down the road.

As a fall back position and eventual crosscheck that you have your 12X set up exactly as your 10X, I also measured and recorded all my control throws in both directions and each dual rate position. Make of note of exactly where your control surface neutral positions are so you can reproduce these later and avoid large trim changes on your first 12X flight. Bear in mind that once you remove your old receiver you no longer have the option of checking these positions and throws or physically observing the response of switch movement and/or mix functions.

Tip: Before making your channel assignments in the next step, explore the options available in the Device Select and Wing Type menus. Unless you have a delta wing jet you will most likely use the SYS option for flaps and Normal for wing type. The Dual options for aileron, elevator, rudder and flaps are actually automatic mixes and should be selected for controls that have 2 surfaces and/or 2 servos. The 12X limits some combinations of aux channels for these functions and you need to determine how they will affect your setup before proceeding.

The next task is to use that same paper tablet and list the 12 channels on your 12X along side the 10 channels you previously recorded from your 10X. Decide now how and to which channel each servo/function will be assigned. Some of the many advantages of the 12X are the extra channels available and the greater flexibility in assigning functions to

switches. You may want to eliminate a Matchbox, or put those ailerons on separate channels instead of a "Y" cord. You can assign your smoke function to a switch that's easier for you to activate or use an extra channel for that bomb drop you've always wanted. Whatever your preferences, now is the time figure out the capabilities of your 12X and how each and every channel and mix will be assigned. Once you actually start programming your radio and plugging in servos it becomes much more complicated and confusing to change things around!

Now is the time to start programming your 12X! You will notice many similarities with your 10X and many of the 12X "Function Mode" numbers are the same as the 10X "Code Functions". One difference is the new System Mode menu on the 12X, where less frequently used functions are located. Accessed by holding down the "ENT" button when you turn on the transmitter, this is where you will name your model, selec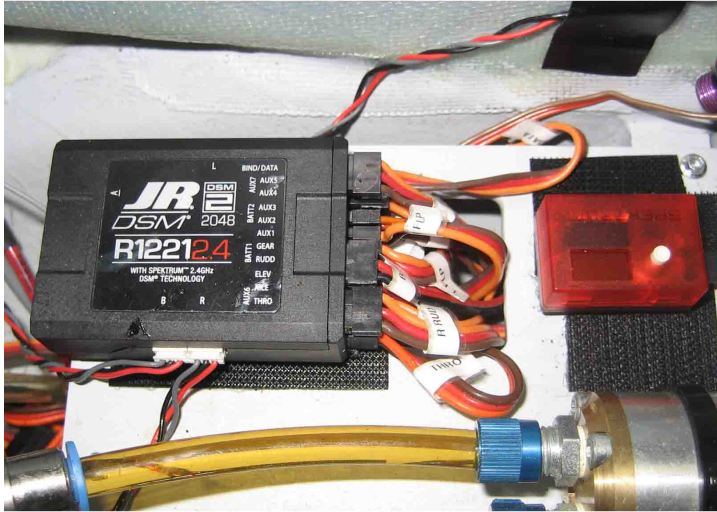t ACRO type and setup your warning alarms. Also on this menu are the Device Select and Wing Type functions. Similar to the Code 17 Function Select on the 10X, Devise Select allows you to activate or inhibit the gear

12x (right) is similar to 10X but uses buttons and rolling selector to enter data. Extra two Aux knobs are located on top.

and flap switches and all 7 aux channels. This is also where you can assign alternate switches to these channels via a clever graphical display of the transmitter and associated switches, sliders and knobs. Wing Type allows you to take advantage of pre-programmed mixes according to your wing/flap setup and assign multiple servos to a single channel in the Dual function. Make your selections before proceeding.
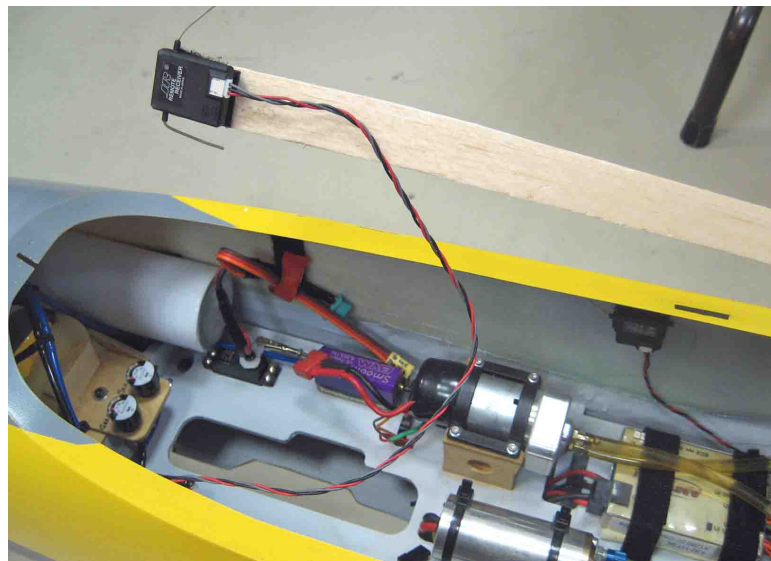
Same size 1221 Rx replaces old R955 perfectly. Note labels on servo leads and red Data Logger located to the right.

Next you will progress to the Function Mode list, accessed by simply pressing the "LIST" button. By now you have figured out that the 12X is not touch screen operated but uses buttons and a "rolling selector" instead. You will quickly come to appreciate the ease and speed of the rolling selector and the large numbers of selections on each menu screen as you begin to program the values and settings from your 10X. You can pretty much follow through the same sequence as your 10X and program the reverse switches, travel adjust, dual rate, expo and sub trim values exactly as they were. The 12X displays and functionality are obviously different than the 10X but will the help of the detailed 12X manual and trial and error, you will quickly get the hang of it and have the information programmed in surprisingly short time.

The program mixes will likewise take some learning to understand and program. Once again, the comparable values from your 10X provide a good starting point. No doubt you will have some new mixes to take advantage of the extra channels on the 12X and at this time you can simply assign what channels are mixed to each other and leave the final adjustments until after everything is hooked up. Lastly, program your miscellaneous functions such as servo speeds, gyro sensitivity and timers, once again starting with your 10X values. With most of these functions you can confirm you are "in the ballpark" by comparing the 10X code 75 Servo Monitor with the Function 75 Monitor on the 12X. The direction and throws should be very similar and in many cases will be identical. Everything will be fine tuned and checked later in the process.

Longest lead remote antenna mounted on balsa stick and ready to slide forward into the nose. Note other antenna on side of fuselage.

L Ail, Throt, Gear, etc.) with a piece of tape or printed label immediately after you remove it from the old receiver. You will probably be using different ports for a least a few of your leads, particularly if you are eliminating a matchbox or "Y" lead. In these cases you will need to re-plumb with the appropriate length extensions. Plug in your battery or batteries (see General Tips below) and then proceed with the placement of your remote receivers.

Depending upon which main receiver you use there will either be 3 or 4 remote receivers to install. They come with varying lengths of extensions from 9" to 36" long. The objective is to place them in different orientations and as far from each other as possible (at least 2-3" apart). A good way to mount the longest lead receiver is to attach it with double sided tape or Velcro to a 1" wide 3/32nd piece of balsa that is long enough to reach up into the nose of your jet. Slide it forward as far as the extension will allow and secure the balsa with a piece of tape or dab of silicone. This way it's easy to retrieve or remove the remote receiver when necessary. Position the other receivers with tape or Velcro on either side of the fuselage and ideally into the wing root. Be sure that at least one of them is positioned horizontally, even if it means fabricating a simple balsa or ply "shelf" attached to a vertical surface. Don't worry about the proximity of other electrical components and wires as 2.4GHz is not to subject interference from these sources.

Check neutral position and measure throws for all control surfaces carefully before first flight.

Now that everything is hooked up and the receivers in place you will need to "bind" your receiver to the transmitter (nothing will work until you do). Follow the instructions in your 12X manual and proceed in the *exact* sequence described. Be sure your throttle and throttle trim are physically set to the failsafe position for your particular brand of turbine as the transmitter will memorize this position during the bind process. Unless you need to reset your failsafe functions, this is the only time you will need to bind the radio. If done correctly, everything will be working now and you can proceed with the process of checking your installation.

To accomplish this step, you will need to completely assemble and air up your jet to physically confirm that everything is working and set properly. Start with the neutral position and direction and throws for all control surfaces, being sure to check each dual-rate position. Adjust mixes, sub-trims and throws as necessary to reproduce neutral positions and the control surface deflection measurements you recorded earlier. Next,

check the operation of landing gear, brakes, nose wheel steering, gyro and all other programmed channels and adjust as necessary so everything functions correctly. Make sure all mixes and switches work as intended and if you have created new mixes, check their functionality and adjust/confirm proper direction and throws. Finally, program your throttle settings as necessary for failsafe operation. This procedure varies with different turbine brands but it is critically important that your failsafe setup will cause the engine to shutdown within 2 seconds of loss of radio signal!

The final step before flying is to accomplish a range check. Purchase or borrow a JR Data Logger and plug it into the bind/data port. Go to the Advanced Range Testing section of the 12X manual and carefully follow the described process. The data logger will record the number of lost frames and any failsafe "holds". You can check each individual receiver and reposition any that have recorded a high number of holds. Leave the data logger installed for at least the first few flights and check it before shutting off power for the lost frame count and any holds after each flight. The data logger is also useful in that it continuously displays the voltage being provided to the receiver.

That's it! You are ready to fly! I suggest taking your channel function list with you to the field as a reference. You might want to review your switch functions and mixes, particularly if any have changed from your previous setup or if you need to make some adjustments after your first flight. If you have followed the process carefully I think you will find that your first 12X flight will be very similar to your last one with the 10X. Even your trims should be very close and need little adjustment. Remember to check your data logger after the first few flights and if necessary, reposition one or more of your remote antennas. Otherwise, enjoy the smoothness of the 12X's high resolution and the security of flying on 2.4!

General Tips and Info about the 12X and 2.4 GHz

This section contains some general information about the 12X and 2.4 that is not specifically associated with changing from the 10X but which might prove useful as learn about your new radio, installation options, and 2.4GHz.

Which Receiver? - JR currently offers two 12 channel receivers for the 12X, the R1221 and R1222. Both operate identically and are physically the same except that the 1222 does not have an internal antenna and has an extra remote antenna instead. The main difference is that the R1222 is designed to operate with higher current (amp) capability through the addition of 16AWG dual battery leads and pre-wired E-Flite EC3 connectors. It also comes with a fail-on "soft switch". JR recommends the R1222 for "jets with multiple high current draw servos". Another method to accommodate high draw servos is to use the R1221 in conjunction with the Powerbox Duralite SC12, Smart Fly EQ10 or

similar products. These sophisticated devises also offer means to mix and adjust servos and functions beyond the capabilities of the 12X. The JR Matchbox can also be used for channel expansion and separate power sourcing for associated servos.

Batteries - Both the R1221 and R1222 provide for two battery inputs and the option of using one or two batteries. Two batteries are better than one but in either case, the recommended voltage input should be between 6 and 10 volts. This means that at least a 5 cell NiCad/NiMH or 2 cell LiPo will be needed. These receivers do not regulate voltage to the servos so use a voltage regulator if you wish to limit the voltage delivered to your servos. Four cell packs are definitely **not** adequate under load to maintain the minimum operating threshold of 3.5 volts and should not be used!

Incompatibilities – Certain electrical devices may not work properly with 2.4GHz. Among these are some older version gear/door sequencers and non-digital servos. It is recommended not to use an analog servo on your gear retract valve as they may cycle when the receiver is first switched on. Some electronic sequencers and other accessories will specifically state they are "compatible with 2.4 GHz radio systems" in their product description. If you have any doubts or questions about a particular product, contact the appropriate manufacturer or dealer. **Note: Horizon Hobby sells a product called Spectrum Signal Line Voltage Booster which is designed to increase signal line voltage and allow some of the older gear sequencers to work with their receivers. It can be viewed here: http://horizonhobby.com/Products/Default.aspx?ProdID=SPMI**

Failsafe Options – The 12X offers two failsafe options. The so-called "SmartSafe" failsafe is the default option and will drive the throttle to whatever position it was in when the last "bind" process was accomplished. All other channels "hold" their last command. If you wish to set specific failsafe positions for other channels then you will need to follow the steps for "Preset Failsafe" as described in the 12X or receiver manuals.

Be sure to comply with the requirements of your particular brand turbine to ensure it will shut down within 2 seconds of loosing a radio signal. (Note: After binding at 100%, JetCat recommends re-setting the throttle throws to high/lows of 50% for the 12X versus the normal 75% for other radios!)

Throttle Ratchet and Friction – The 12X throttle does not have the traditional ratcheting action of previous JR transmitters. Although most pilots quickly adjust and

Phillips screwdriver points to friction access hole

actually prefer the non-ratcheting throttle, others prefer the ratchet. If so, have your transmitter modified by JR prior to purchase or send yours in for modification. You are strongly discouraged by JR from opening the case to perform this modification yourself.

Throttle friction can be adjusted with a Phillips screwdriver through a small hole on the back of the transmitter. The hole is located near the lower right corner of the 2.4 DSM module. Remove the rubber cover to accesses the adjusting screw

Control Sensitivity – The 12X radio has resolution of 2048 versus 1024 for the 10X. For this reason, some pilots believe the 12X is more "sensitive" and have increased their expo settings by 5 to 10% or more. I recommend you fly your jet with the same expo settings you used previously and make your own judgment. Alternately, you could program one of your dual-rate settings with a higher expo setting and make an in-flight comparison.

New Features and Help – There are many new features on the 12X radio that are not mentioned in this article. Among them are programmable warning functions (such as gear switch not down when you turn on the radio), throttle activated timer, flap/elevator trim delay, dual direction servo speed adjust, servo balance (2 servos on one control), mix-monitor function, and many more. As you get to know your radio and talk to other modelers you will find ways to incorporate these features into your setup. JR reps attend most jet meets and are very helpful in explaining how the radio works and answering your questions. Horizon Hobby (www.horizonhobby.com) has excellent technical support along with downloadable electronic versions of manuals for their products. Additionally, Horizon has a dedicated web site known as Team Horizon (www.team-horizon.com) where a wealth of information can be found on JR radio products. The site includes topical articles and an interactive forum where you can ask questions and get answers directly from JR reps. Give it a try!